

ANALYTICAL REPORT

June 11, 2019

¹Cp

²Tc

³Ss

⁴Cn

⁵Tr

⁶Gl

⁷Al

⁸Sc

Cardno - Newark, DE

Sample Delivery Group: L1098246

Samples Received: 05/13/2019

Project Number:

Description:

Report To: Art Saunders
121 Continental Drive Suite 308
Newark, DE 19713

Entire Report Reviewed By:



Craig Cothron
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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ONE LAB. NATIONWIDE.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



WW-20190511-002-DAY 9 L1098246-01 GW

Collected by
CP/RF Collected date/time
05/11/19 11:30 Received date/time
05/13/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Subcontracted Analyses	WG1280338	1	05/31/19 00:00	05/31/19 00:00	CBM	Minneapolis, MN 55414

¹Cp²Tc³Ss⁴Cn⁵Tr⁶Gl⁷Al⁸Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Craig Cothron
Project Manager

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Tr
- ⁶ Gl
- ⁷ Al
- ⁸ Sc

Project Narrative

L1098246 -01 contains subout data that is included after the chain of custody.



This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

- a. Items consistent with NELAC Chapter 5,
- b. dilution factors,
- c. preparation methods,
- d. cleanup methods, and
- e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

- a. Calculated recovery (%R), and
- b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

- a. LCS spiking amounts,
- b. Calculated %R for each analyte, and
- c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

- a. Samples associated with the MS/MSD clearly identified,
- b. MS/MSD spiking amounts,
- c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,
- d. Calculated %Rs and relative percent differences (RPDs), and
- e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

- a. The amount of analyte measured in the duplicate,
- b. The calculated RPD, and
- c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Craig Cothron
Project Manager



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

SDG	Sample Delivery Group.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

¹Cp²Tc³Ss⁴Cn⁵Tr⁶Gl⁷Al⁸Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

- * Not all certifications held by the laboratory are applicable to the results reported in the attached report.
- * Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia ¹	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky ^{1,6}	90010
Kentucky ²	16
Louisiana	AI30792
Louisiana ¹	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey-NELAP	TN002
New Mexico ¹	n/a
New York	11742
North Carolina	Env375
North Carolina ¹	DW21704
North Carolina ³	41
North Dakota	R-140
Ohio-VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LA000356
South Carolina	84004
South Dakota	n/a
Tennessee ^{1,4}	2006
Texas	T104704245-18-15
Texas ⁵	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

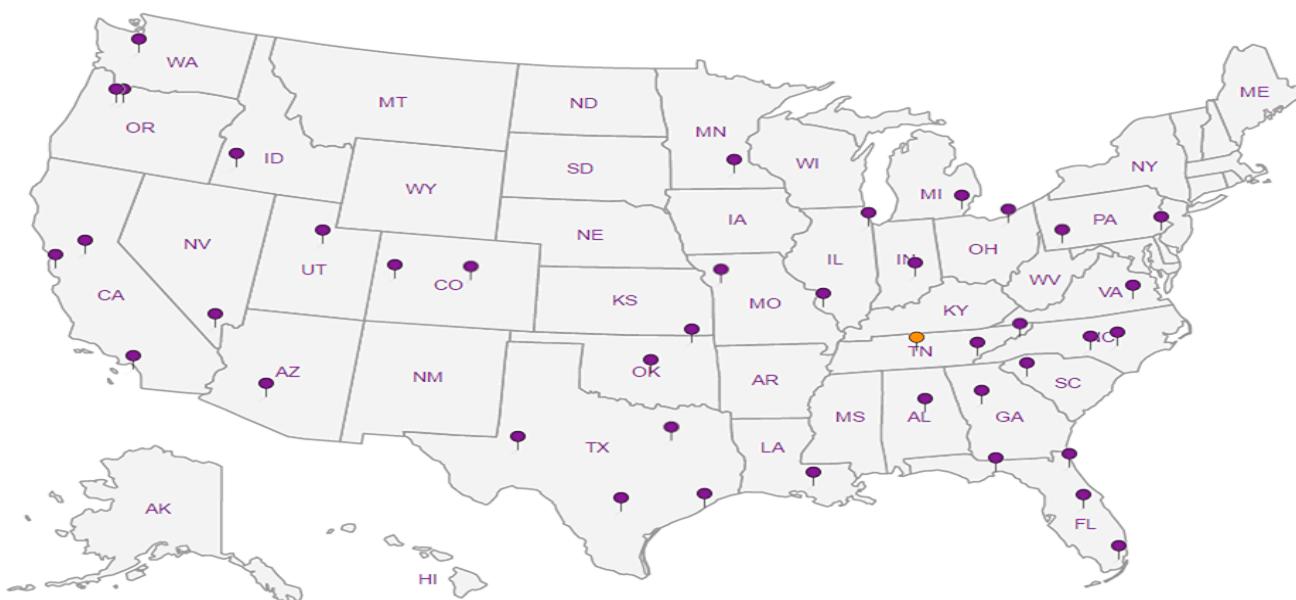
A2LA – ISO 17025	1461.01
A2LA – ISO 17025 ⁵	1461.02
Canada	1461.01
EPA-Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Tr
- ⁶ Gl
- ⁷ Al
- ⁸ Sc

Report Prepared for:

Benita Miller
Pace Analytical National
12065 Lebanon Road
Mount Juliet TN 37122

**REPORT OF
LABORATORY
ANALYSIS FOR
PCDD/PCDF**

Report Prepared Date:
May 28, 2019

Report Information:

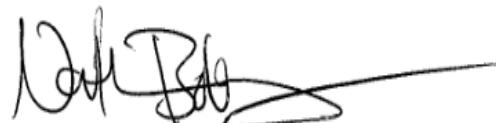
Pace Project #: 10475258
Sample Receipt Date: 05/16/2019
Client Project #: L1098246: WG1280338
Client Sub PO #: L1098246
State Cert #: N/A

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 3 PCDD/PCDF Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Nathan Boberg, your Pace Project Manager.

This report has been reviewed by:



May 28, 2019

Nathan Boberg, Project Manager
612-360-0728
(612) 607-6444 (fax)
nathan.boberg@pacelabs.com



Report of Laboratory Analysis

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.



Pace Analytical Services, LLC.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

DISCUSSION

This report presents the results from the analysis performed on one sample submitted by a representative of Pace Analytical National. The sample was analyzed for the presence or absence of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs) using USEPA Method 1613B. The reporting limits were based on signal-to-noise measurements. Estimated Maximum Possible Concentration (EMPC) values were treated as positives in the toxic equivalence calculations.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extract ranged from 55-80%. All of the labeled standard recoveries obtained for this project were within the target ranges specified in Method 1613B. Also, since the quantification of the native 2,3,7,8-substituted congeners was based on isotope dilution, the data were automatically corrected for recovery and accurate values were obtained.

Values were flagged "I" where incorrect isotope ratios were obtained. Concentrations below the calibration range were flagged "J" and should be regarded as estimates.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank to contain trace levels of selected congeners. These levels were below the calibration range of the method. Sample levels similar to the corresponding blank levels were flagged "B" on the results table and may be, at least partially, attributed to the background. It should be noted that levels less than ten times the background are not generally considered to be statistically different from the background.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standard materials. The results show that the spiked native compounds were recovered at 90-121% with relative percent differences of 0.0-8.5%. These results were within the target ranges for the method. Matrix spikes were not prepared with the sample batch.

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

REPORT OF LABORATORY ANALYSIS

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Report No.....10475258

Reporting Flags

- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- L = Suppressive interference, analyte may be biased low
- Nn = Value obtained from additional analysis
- P = PCDEInterference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- * = SeeDiscussion

REPORT OF LABORATORY ANALYSIS

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without the written consent of Pace Analytical Services, Inc.

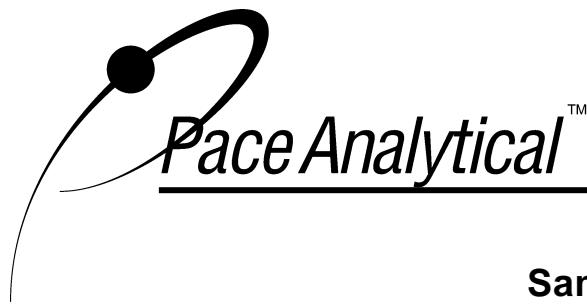
Report No.....10475258

Report No.....10475258_1613FC_DFR

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Appendix A

Sample Management



Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Sample ID Cross Reference

Client Sample ID

WW-20190511-002-DAY 9

Pace Sample ID

10475258001

Date Received

05/16/2019

Sample Type

Water

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc.

CHAIN-OF-CUSTODY / Analytical Request Doc

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed.

WO# : 10475258

Report No: 10475258_1613EC_DER

Section A
Required Client Information:

Company: Pace Analytical National
 Address: 12065 Lebanon Road
 Mount Juliet, TN 37122
 Email: SuboutTeam@pacenational.com
 Phone: (615)773-9756 Fax: (615)758-5859
 Requested Due Date: 28-May

Section B

Required Project information:

Report To: Pace Analytical National Subout Team
 Copy To:
 Purchase Order #: L1098246
 Project Name: NA
 Project #: NA

Section C

Invoice Information:

Attention: Art Saunders
 Company Name:
 Address:
 Pace Quote:
 Pace Project Manager: Nathan Boberg
 Pace Profile #: 38076



10475258

Regulatory Agency

State / Location

DE

# WELL	SAMPLE ID <small>One Character per box. (A-Z, 0-9 /, -) Sample IDs must be unique</small>	MATRIX Drinking Water Water Waste Water Product Soil/Solid Oil Wipe Air Other Tissue	CODE DW WT WW P SL OL WP AR OT TS	MATRIX CODE (see valid codes to left) <small>(G=GRAB C=COMP)</small>	COLLECTED		SAMPLE TEMP AT COLLECTION	Preservatives						Analysis Testes	Requested Analysis Filtered (Y/N)				Residual Chlorine (Y/N)	
					START	END		# OF CONTAINERS	Unpressured	H ₂ SO ₄	3ONH ₄	I ₂	NaOH		Na ₂ SO ₃	MeOH	Other	EPA 1613 and EPA 537		
1	WW-20190511-002-DAY 9		WT		11-May	11:30	2	2						X						001
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
ADDITIONAL COMMENTS				RELINQUISHED BY / AFFILIATION		DATE	TIME	ACCEPTED BY / AFFILIATION		DATE	TIME	SAMPLE CONDITIONS								
Pace Analytical National Batch: WG1280338				Benita Miller		15-May	12:39	Elroy Ali Sae		5/14/19	9:50									
Pace Analytical National SDGs: L1098246				<i>Submittal</i>		5/15/19	11:30			5-16-19	9:35	4.3	Y	Y	Y					
Location: Minneapolis, MN 55414				SAMPLER NAME AND SIGNATURE										TEMP in C						
				PRINT Name of SAMPLER:										Received on Ice (Y/N)						
				SIGNATURE of SAMPLER:										Custody Sealed Cooler (Y/N)						
				DATE Signed:										Samples In tact (Y/N)						



**Sample Condition
Upon Receipt**

Client Name:

Pace National

Project #:

WO# : 10475258

Courier:

FedEx UPS USPS Client
 Pace SpeeDee Commercial See Exception

Tracking Number: **7752 2773 5985**

Custody Seal on Cooler/Box Present? Yes No **Seals Intact?** Yes No **Biological Tissue Frozen?** Yes No N/A

Packing Material: Bubble Wrap Bubble Bags None Other: _____ **Temp Blank?** Yes No

Thermometer: T1(0461) T2(1336) T3(0459)
 T4(0254) T5(0048) **Type of Ice:** Wet Blue None Dry Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C	Cooler Temp Read w/temp blank: _____ °C	Average Corrected Temp See Exceptions (no temp blank only): 4.3 °C
Correction Factor: <i>true</i>	Cooler Temp Corrected w/temp blank: _____ °C	

USDA Regulated Soil: (N/A, water sample/Other: _____) **Date/Initials of Person Examining Contents:** **S-17-19 AA**
Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? Yes No Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? Yes No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

			COMMENTS:
Chain of Custody Present and Filled Out?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.	
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.	
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	3.	
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4.	
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E. coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other	
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.	
Sufficient Volume?	<input type="checkbox"/> Yes <input type="checkbox"/> No	7.	
Correct Containers Used? -Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	8.	
Containers Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.	
Field Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Is sufficient information available to reconcile the samples to the COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	11. If no, write ID/ Date/Time on Container Below: See Exception <input type="checkbox"/>	
Matrix: <input checked="" type="checkbox"/> Water <input type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other			
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	12. Sample # <input type="checkbox"/> NaOH <input type="checkbox"/> HNO ₃ <input type="checkbox"/> H ₂ SO ₄ <input type="checkbox"/> Zinc Acetate	
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO ₃ , H ₂ SO ₄ , <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Positive for Res. <input type="checkbox"/> Yes Chlorine? <input type="checkbox"/> No pH Paper Lot# <input type="checkbox"/> Res. Chlorine 0-6 Roll 0-6 Strip 0-14 Strip	
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	See Exception	
Headspace in VOA Vials (greater than 6mm)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13. See Exception <input type="checkbox"/>	
Trip Blank Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14.	
Trip Blank Custody Seals Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Pace Trip Blank Lot # (if purchased): _____	

CLIENT NOTIFICATION/RESOLUTION

Person Contacted: _____

Date/Time: _____

Comments/Resolution: _____

Field Data Required? Yes No

Project Manager Review: *Matthew Roberts*

Date: **5/17/19**

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: *AA*



Document Name:
SCUR Exception Form – Coolers Above 6°C

Document Revised: 08Apr2019

Page 1 of 1

Document No.:
F-MN-C-298-Rev.02

Issuing Authority:
Pace Minnesota Quality Office

During sample triage, this form is to be placed in each cooler that arrives above 6.0 degrees Celsius

SCUR Exceptions:

Workorder #:

Out of Temp Sample IDs	Container Type	# of Containers	PM Notified? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
			If yes, indicate who was contacted/date/time. If no, indicate reason why.
			Multiple Cooler Project? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If you answered yes, fill out information to the left.
			No Temp Blank Read Temp Corrected Temp Average Temp 5.2 <i>True</i> 4.3 3.3 <i>True</i> _____ _____

Tracking Number/Temperature

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preserv.	pH Upon Receipt	Date Adjusted	Time Adjusted	Amount Added (mL)	Lot # Added	pH After	In Compliance after addition?	Initials
								<input type="checkbox"/> Yes <input type="checkbox"/> No	
								<input type="checkbox"/> Yes <input type="checkbox"/> No	
								<input type="checkbox"/> Yes <input type="checkbox"/> No	
								<input type="checkbox"/> Yes <input type="checkbox"/> No	

Appendix B

Sample Analysis Summary



Method 1613B Sample Analysis Results

Client - Pace Analytical National

Client's Sample ID	WW-20190511-002-DAY 9				
Lab Sample ID	10475258001				
Filename	Y190524A_05				
Injected By	JRH				
Total Amount Extracted	988 mL		Matrix	Water	
% Moisture	NA		Dilution	NA	
Dry Weight Extracted	NA		Collected	05/11/2019 11:30	
ICAL ID	Y190424		Received	05/16/2019 09:35	
CCal Filename(s)	Y190524A_01		Extracted	05/20/2019 11:20	
Method Blank ID	BLANK-70663		Analyzed	05/24/2019 15:59	

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.64	2,3,7,8-TCDF-13C	2.00	68
Total TCDF	ND	----	0.64	2,3,7,8-TCDD-13C	2.00	72
1,2,3,7,8-TCDD	ND	----	0.90	1,2,3,7,8-PeCDF-13C	2.00	70
Total TCDD	ND	----	0.90	2,3,4,7,8-PeCDF-13C	2.00	70
				1,2,3,7,8-PeCDD-13C	2.00	80
				1,2,3,4,7,8-HxCDF-13C	2.00	69
1,2,3,7,8-PeCDF	ND	----	0.73	1,2,3,6,7,8-HxCDF-13C	2.00	71
2,3,4,7,8-PeCDF	ND	----	0.85	2,3,4,6,7,8-HxCDF-13C	2.00	69
Total PeCDF	ND	----	0.79	1,2,3,7,8,9-HxCDF-13C	2.00	68
				1,2,3,4,7,8-HxCDD-13C	2.00	67
1,2,3,7,8-PeCDD	ND	----	1.9	1,2,3,6,7,8-HxCDD-13C	2.00	62
Total PeCDD	ND	----	1.9	1,2,3,4,6,7,8-HpCDF-13C	2.00	62
				1,2,3,4,7,8,9-HpCDF-13C	2.00	59
1,2,3,4,7,8-HxCDF	ND	----	1.5	1,2,3,4,6,7,8-HpCDD-13C	2.00	67
1,2,3,6,7,8-HxCDF	ND	----	1.6	OCDD-13C	4.00	55
2,3,4,6,7,8-HxCDF	ND	----	1.7			
1,2,3,7,8,9-HxCDF	ND	----	0.93	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	1.4	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	1.9	2,3,7,8-TCDD-37Cl4	0.20	84
1,2,3,6,7,8-HxCDD	ND	----	1.6			
1,2,3,7,8,9-HxCDD	ND	----	2.2			
Total HxCDD	ND	----	1.9			
1,2,3,4,6,7,8-HpCDF	ND	----	1.3	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	1.3	Equivalence: 0.0022 pg/L		
Total HpCDF	ND	----	1.3	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	----	1.9			
Total HpCDD	ND	----	1.9			
OCDF	ND	----	3.1			
OCDD	7.4	----	4.0	BJ		

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

ND = Not Detected

EMPC = Estimated Maximum Possible Concentration

NA = Not Applicable

EDL = Estimated Detection Limit

NC = Not Calculated

J = Estimated value

B = Less than 10x higher than method blank level

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2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	WW-20190511-002-DAY 9		
Lab Sample ID	10475258001		
Filename	Y190524A_05		
Injected By	JRH		
Total Amount Extracted	988 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	05/11/2019 11:30
ICAL ID	Y190424	Received	05/16/2019 09:35
CCal Filename(s)	Y190524A_01	Extracted	05/20/2019 11:20
Method Blank ID	BLANK-70663	Analyzed	05/24/2019 15:59

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	0.64	0.10000	0.0000	0.0320	0.0640
Total TCDF	ND	0.64	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	0.90	1.00000	0.0000	0.4487	0.8973
Total TCDD	ND	0.90	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	0.73	0.03000	0.0000	0.0109	0.0218
2,3,4,7,8-PeCDF	ND	0.85	0.30000	0.0000	0.1273	0.2547
Total PeCDF	ND	0.79	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	1.9	1.00000	0.0000	0.9553	1.9105
Total PeCDD	ND	1.9	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	1.5	0.10000	0.0000	0.0758	0.1516
1,2,3,6,7,8-HxCDF	ND	1.6	0.10000	0.0000	0.0819	0.1638
2,3,4,6,7,8-HxCDF	ND	1.7	0.10000	0.0000	0.0840	0.1681
1,2,3,7,8,9-HxCDF	ND	0.93	0.10000	0.0000	0.0467	0.0933
Total HxCDF	ND	1.4	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	1.9	0.10000	0.0000	0.0948	0.1897
1,2,3,6,7,8-HxCDD	ND	1.6	0.10000	0.0000	0.0815	0.1630
1,2,3,7,8,9-HxCDD	ND	2.2	0.10000	0.0000	0.1115	0.2231
Total HxCDD	ND	1.9	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	1.3	0.01000	0.0000	0.0066	0.0132
1,2,3,4,7,8,9-HpCDF	ND	1.3	0.01000	0.0000	0.0066	0.0132
Total HpCDF	ND	1.3	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	ND	1.9	0.01000	0.0000	0.0097	0.0194
Total HpCDD	ND	1.9	0.00000	0.0000	0.0000	0.0000
OCDF	ND	3.1	0.00030	0.0000	0.0005	0.0009
OCDD	7.4	4.0	0.00030	0.0022	0.0022	0.0022

0.0022 pg/L 2.2 pg/L 4.3 pg/L

Final values are valid to only 2 significant figures

TEQs for Totals classes include contributions from non 2,3,7,8 isomers only

LB = Lower Bound, Where "ND", TEQ Conc = 0

MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) * (TEF Factor)

UB = Upper Bound, Where "ND", TEQ Conc = LOD * (TEF Factor)

RL = Reporting Limit

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Appendix C

QC and Calibration Results Summary



Method 1613B Blank Analysis Results

Lab Sample Name	DFBLKXM	Matrix	
Lab Sample ID	BLANK-70663	Dilution	Water
Filename	Y190523A_12	Extracted	NA
Total Amount Extracted	973 mL	Analyzed	05/20/2019 11:20
ICAL ID	Y190424	Injected By	05/23/2019 16:24
CCal Filename(s)	Y190523A_05		SMT

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.40	2,3,7,8-TCDF-13C	2.00	66
Total TCDF	0.66	----	0.40 J	2,3,7,8-TCDD-13C	2.00	65
				1,2,3,7,8-PeCDF-13C	2.00	67
2,3,7,8-TCDD	----	0.73	0.66 IJ	2,3,4,7,8-PeCDF-13C	2.00	66
Total TCDD	ND	----	0.66	1,2,3,7,8-PeCDD-13C	2.00	71
				1,2,3,4,7,8-HxCDF-13C	2.00	65
1,2,3,7,8-PeCDF	ND	----	0.60	1,2,3,6,7,8-HxCDF-13C	2.00	67
2,3,4,7,8-PeCDF	ND	----	0.60	2,3,4,6,7,8-HxCDF-13C	2.00	65
Total PeCDF	ND	----	0.60	1,2,3,7,8,9-HxCDF-13C	2.00	68
				1,2,3,4,7,8-HxCDD-13C	2.00	60
1,2,3,7,8-PeCDD	ND	----	1.2	1,2,3,6,7,8-HxCDD-13C	2.00	57
Total PeCDD	ND	----	1.2	1,2,3,4,6,7,8-HpCDF-13C	2.00	62
				1,2,3,4,7,8-HpCDF-13C	2.00	63
1,2,3,4,7,8-HxCDF	ND	----	1.6	1,2,3,4,6,7,8-HpCDD-13C	2.00	65
1,2,3,6,7,8-HxCDF	ND	----	1.2	OCDD-13C	4.00	57
2,3,4,6,7,8-HxCDF	ND	----	1.5			
1,2,3,7,8,9-HxCDF	ND	----	0.64	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	1.2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	1.6	2,3,7,8-TCDD-37Cl4	0.20	85
1,2,3,6,7,8-HxCDD	ND	----	1.6			
1,2,3,7,8,9-HxCDD	ND	----	1.4			
Total HxCDD	ND	----	1.5			
1,2,3,4,6,7,8-HpCDF	ND	----	0.66	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	0.83	Equivalence: 0.75 pg/L		
Total HpCDF	ND	----	0.74	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	1.7	----	0.74 J			
Total HpCDD	1.7	----	0.74 J			
OCDF	----	1.9	1.2 IJ			
OCDD	16	----	2.5 J			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

EDL = Estimated Detection Limit

J = Estimated value

I = Interference present

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2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	DFBLKXM				
Lab Sample ID	BLANK-70663				
Filename	Y190523A_12				
Injected By	SMT				
Total Amount Extracted	973 mL		Matrix	Water	
% Moisture	NA		Dilution	NA	
Dry Weight Extracted	NA		Collected	05/17/2019 16:57	
ICAL ID	Y190424		Received	05/17/2019 16:57	
CCal Filename(s)	Y190523A_05		Extracted	05/20/2019 11:20	
Method Blank ID			Analyzed	05/23/2019 16:24	

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	0.40	0.10000	0.0000	0.0199	0.0399
Total TCDF	0.66	0.40	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	0.66	1.00000	0.7312	0.7312	0.7312
Total TCDD	ND	0.66	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	0.60	0.03000	0.0000	0.0090	0.0180
2,3,4,7,8-PeCDF	ND	0.60	0.30000	0.0000	0.0902	0.1804
Total PeCDF	ND	0.60	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	1.2	1.00000	0.0000	0.5994	1.1988
Total PeCDD	ND	1.2	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	1.6	0.10000	0.0000	0.0777	0.1553
1,2,3,6,7,8-HxCDF	ND	1.2	0.10000	0.0000	0.0581	0.1162
2,3,4,6,7,8-HxCDF	ND	1.5	0.10000	0.0000	0.0740	0.1479
1,2,3,7,8,9-HxCDF	ND	0.64	0.10000	0.0000	0.0318	0.0637
Total HxCDF	ND	1.2	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	1.6	0.10000	0.0000	0.0809	0.1618
1,2,3,6,7,8-HxCDD	ND	1.6	0.10000	0.0000	0.0794	0.1588
1,2,3,7,8,9-HxCDD	ND	1.4	0.10000	0.0000	0.0685	0.1370
Total HxCDD	ND	1.5	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	0.66	0.01000	0.0000	0.0033	0.0066
1,2,3,4,7,8,9-HpCDF	ND	0.83	0.01000	0.0000	0.0041	0.0083
Total HpCDF	ND	0.74	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	1.7	0.74	0.01000	0.0174	0.0174	0.0174
Total HpCDD	1.7	0.74	0.00000	0.0000	0.0000	0.0000
OCDF	ND	1.2	0.00030	0.0006	0.0006	0.0006
OCDD	16	2.5	0.00030	0.0048	0.0048	0.0048

0.75 pg/L 2.0 pg/L 3.1 pg/L

Final values are valid to only 2 significant figures

TEQs for Totals classes include contributions from non 2,3,7,8 isomers only

LB = Lower Bound, Where "ND", TEQ Conc = 0

MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) * (TEF Factor)

UB = Upper Bound, Where "ND", TEQ Conc = LOD * (TEF Factor)

RL = Reporting Limit

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Pace Analytical Services, LLC
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Minneapolis, MN 55414

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Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCS-70664	Matrix	Water
Filename	F190522A_02	Dilution	NA
Total Amount Extracted	951 mL	Extracted	05/20/2019 11:20
ICAL ID	F190508	Analyzed	05/22/2019 09:05
CCal Filename	F190522A_01	Injected By	SMT
Method Blank ID	BLANK-70663		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	11	7.5	15.8	107
2,3,7,8-TCDD	10	12	6.7	15.8	116
1,2,3,7,8-PeCDF	50	55	40.0	67.0	110
2,3,4,7,8-PeCDF	50	55	34.0	80.0	109
1,2,3,7,8-PeCDD	50	50	35.0	71.0	100
1,2,3,4,7,8-HxCDF	50	55	36.0	67.0	109
1,2,3,6,7,8-HxCDF	50	54	42.0	65.0	108
2,3,4,6,7,8-HxCDF	50	50	35.0	78.0	100
1,2,3,7,8,9-HxCDF	50	53	39.0	65.0	105
1,2,3,4,7,8-HxCDD	50	59	35.0	82.0	117
1,2,3,6,7,8-HxCDD	50	60	38.0	67.0	121
1,2,3,7,8,9-HxCDD	50	60	32.0	81.0	119
1,2,3,4,6,7,8-HpCDF	50	55	41.0	61.0	111
1,2,3,4,7,8,9-HpCDF	50	54	39.0	69.0	108
1,2,3,4,6,7,8-HpCDD	50	49	35.0	70.0	98
OCDF	100	110	63.0	170.0	114
OCDD	100	98	78.0	144.0	98
2,3,7,8-TCDD-37Cl4	10	8.9	3.1	19.1	89
2,3,7,8-TCDF-13C	100	79	22.0	152.0	79
2,3,7,8-TCDD-13C	100	71	20.0	175.0	71
1,2,3,7,8-PeCDF-13C	100	67	21.0	192.0	67
2,3,4,7,8-PeCDF-13C	100	64	13.0	328.0	64
1,2,3,7,8-PeCDD-13C	100	62	21.0	227.0	62
1,2,3,4,7,8-HxCDF-13C	100	64	19.0	202.0	64
1,2,3,6,7,8-HxCDF-13C	100	71	21.0	159.0	71
2,3,4,6,7,8-HxCDF-13C	100	75	22.0	176.0	75
1,2,3,7,8,9-HxCDF-13C	100	74	17.0	205.0	74
1,2,3,4,7,8-HxCDD-13C	100	59	21.0	193.0	59
1,2,3,6,7,8-HxCDD-13C	100	60	25.0	163.0	60
1,2,3,4,6,7,8-HpCDF-13C	100	57	21.0	158.0	57
1,2,3,4,7,8,9-HpCDF-13C	100	58	20.0	186.0	58
1,2,3,4,6,7,8-HpCDD-13C	100	63	26.0	166.0	63
OCDD-13C	200	100	26.0	397.0	52

Cs = Concentration Spiked (ng/mL)

Cr = Concentration Recovered (ng/mL)

Rec. = Recovery (Expressed as Percent)

Control Limit Reference: Method 1613, Table 6, 10/94 Revision

R = Recovery outside of control limits

Nn = Value obtained from additional analysis

* = See Discussion

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Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCSD-70665	Matrix	Water
Filename	F190522A_03	Dilution	NA
Total Amount Extracted	944 mL	Extracted	05/20/2019 11:20
ICAL ID	F190508	Analyzed	05/22/2019 09:46
CCal Filename	F190522A_01	Injected By	SMT
Method Blank ID	BLANK-70663		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	11	7.5	15.8	109
2,3,7,8-TCDD	10	11	6.7	15.8	112
1,2,3,7,8-PeCDF	50	52	40.0	67.0	104
2,3,4,7,8-PeCDF	50	54	34.0	80.0	108
1,2,3,7,8-PeCDD	50	50	35.0	71.0	100
1,2,3,4,7,8-HxCDF	50	54	36.0	67.0	107
1,2,3,6,7,8-HxCDF	50	52	42.0	65.0	104
2,3,4,6,7,8-HxCDF	50	49	35.0	78.0	98
1,2,3,7,8,9-HxCDF	50	52	39.0	65.0	103
1,2,3,4,7,8-HxCDD	50	54	35.0	82.0	108
1,2,3,6,7,8-HxCDD	50	57	38.0	67.0	114
1,2,3,7,8,9-HxCDD	50	55	32.0	81.0	111
1,2,3,4,6,7,8-HpCDF	50	54	41.0	61.0	108
1,2,3,4,7,8,9-HpCDF	50	52	39.0	69.0	103
1,2,3,4,6,7,8-HpCDD	50	49	35.0	70.0	99
OCDF	100	110	63.0	170.0	109
OCDD	100	90	78.0	144.0	90
2,3,7,8-TCDD-37Cl4	10	9.2	3.1	19.1	92
2,3,7,8-TCDF-13C	100	78	22.0	152.0	78
2,3,7,8-TCDD-13C	100	72	20.0	175.0	72
1,2,3,7,8-PeCDF-13C	100	66	21.0	192.0	66
2,3,4,7,8-PeCDF-13C	100	61	13.0	328.0	61
1,2,3,7,8-PeCDD-13C	100	60	21.0	227.0	60
1,2,3,4,7,8-HxCDF-13C	100	65	19.0	202.0	65
1,2,3,6,7,8-HxCDF-13C	100	69	21.0	159.0	69
2,3,4,6,7,8-HxCDF-13C	100	76	22.0	176.0	76
1,2,3,7,8,9-HxCDF-13C	100	75	17.0	205.0	75
1,2,3,4,7,8-HxCDD-13C	100	63	21.0	193.0	63
1,2,3,6,7,8-HxCDD-13C	100	63	25.0	163.0	63
1,2,3,4,6,7,8-HpCDF-13C	100	59	21.0	158.0	59
1,2,3,4,7,8,9-HpCDF-13C	100	60	20.0	186.0	60
1,2,3,4,6,7,8-HpCDD-13C	100	63	26.0	166.0	63
OCDD-13C	200	110	26.0	397.0	54

Cs = Concentration Spiked (ng/mL)

Cr = Concentration Recovered (ng/mL)

Rec. = Recovery (Expressed as Percent)

Control Limit Reference: Method 1613, Table 6, 10/94 Revision

R = Recovery outside of control limits

Nn = Value obtained from additional analysis

* = See Discussion

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Method 1613B

Spike Recovery Relative Percent Difference (RPD) Results

Client Pace Analytical National

Spike 1 ID LCS-70664 Spike 2 ID LCSD-70665
Spike 1 Filename F190522A_02 Spike 2 Filename F190522A_03

Compound	Spike 1 %REC	Spike 2 %REC	%RPD
2,3,7,8-TCDF	107	109	1.9
2,3,7,8-TCDD	116	112	3.5
1,2,3,7,8-PeCDF	110	104	5.6
2,3,4,7,8-PeCDF	109	108	0.9
1,2,3,7,8-PeCDD	100	100	0.0
1,2,3,4,7,8-HxCDF	109	107	1.9
1,2,3,6,7,8-HxCDF	108	104	3.8
2,3,4,6,7,8-HxCDF	100	98	2.0
1,2,3,7,8,9-HxCDF	105	103	1.9
1,2,3,4,7,8-HxCDD	117	108	8.0
1,2,3,6,7,8-HxCDD	121	114	6.0
1,2,3,7,8,9-HxCDD	119	111	7.0
1,2,3,4,6,7,8-HpCDF	111	108	2.7
1,2,3,4,7,8,9-HpCDF	108	103	4.7
1,2,3,4,6,7,8-HpCDD	98	99	1.0
OCDF	114	109	4.5
OCDD	98	90	8.5

%REC = Percent Recovered

RPD = The difference between the two values divided by the mean value

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Method 1613B
Initial Calibration (ICAL) - Response Factor Summary

ICAL ID	F190508	Data Files:			Time	Injected
Calibration Date	05/08/2019	CS-1	F190508A_04	11:43	SMT	
Instrument	10MSHR05 (F)	CS-2	F190508A_03	11:02	SMT	
Column Phase	ZB5-MS 0.25mm	CS-3	F190508A_02	10:00	SMT	
Column ID No.	ZB5-MS-629919	CS-4	F190508A_06	13:46	SMT	
		CS-5	F190508A_05	13:05	SMT	
Isomer		CS-1	CS-2	CS-3	CS-4	CS-5
					Ave RF	%RSD
2,3,7,8-TCDF		0.8288	0.8067	0.8548	0.9247	0.8692
2,3,7,8-TCDD		0.7258	0.7466	0.9053	0.8472	0.8226
1,2,3,7,8-PeCDF		0.7848	0.8155	0.9265	0.9294	0.9605
2,3,4,7,8-PeCDF		0.9141	0.9583	1.0049	1.0616	1.0418
1,2,3,7,8-PeCDD		0.7512	0.7742	0.8516	0.8895	0.8836
1,2,3,4,7,8-HxCDF		1.0236	1.1127	1.1608	1.1726	1.2089
1,2,3,6,7,8-HxCDF		1.0014	1.0246	1.1187	1.1501	1.1270
2,3,4,6,7,8-HxCDF		1.0507	1.1409	1.1858	1.2495	1.2346
1,2,3,7,8,9-HxCDF		0.9781	1.0316	1.0873	1.1379	1.1166
1,2,3,4,7,8-HxCDD		0.8555	0.8687	0.9233	0.9402	0.9573
1,2,3,6,7,8-HxCDD		0.8314	0.9043	0.9052	0.9359	0.9026
1,2,3,7,8,9-HxCDD		0.8565	0.8763	0.9003	0.9266	0.9153
1,2,3,4,6,7,8-HpCDF		1.1049	1.1654	1.1997	1.2823	1.2449
1,2,3,4,7,8,9-HpCDF		1.1387	1.1656	1.2257	1.2892	1.2353
1,2,3,4,6,7,8-HpCDD		0.8917	0.9372	0.9719	1.0276	1.0178
OCDF		0.9256	0.9767	0.9981	1.0986	1.0703
OCDD		0.8835	0.9641	0.9292	0.9824	0.9725
Total PeCDF		0.8494	0.8869	0.9657	0.9955	1.0012
Total HxCDF		1.0134	1.0775	1.1381	1.1775	1.1718
Total HxCDD		0.8478	0.8831	0.9096	0.9343	0.9362
Total HpCDF		1.1218	1.1655	1.2127	1.2857	1.2401
2,3,7,8-TCDF-13C		1.2774	1.2742	1.2612	1.2461	1.2611
2,3,7,8-TCDD-13C		1.0321	1.0459	1.0771	1.0111	1.0470
2,3,7,8-TCDD-37Cl4		0.8169	0.9323	0.9533	0.9783	1.0309
1,2,3,7,8-PeCDF-13C		1.0537	1.0775	1.0227	1.0200	1.0592
2,3,4,7,8-PeCDF-13C		1.0512	1.0726	1.0678	1.0115	1.0827
1,2,3,7,8-PeCDD-13C		0.7608	0.7921	0.7924	0.7409	0.7983
1,2,3,4,7,8-HxCDF-13C		1.1556	1.0886	0.9809	1.1450	1.1002
1,2,3,6,7,8-HxCDF-13C		1.2681	1.2256	1.0928	1.2756	1.2214
2,3,4,6,7,8-HxCDF-13C		1.1349	1.0734	0.9911	1.1211	1.0874
1,2,3,7,8,9-HxCDF-13C		1.0058	0.9854	0.8807	0.9933	0.9866
1,2,3,4,7,8-HxCDD-13C		1.0164	0.9810	0.8696	1.0258	1.0080
1,2,3,6,7,8-HxCDD-13C		1.1202	1.1043	1.0208	1.1355	1.1310
1,2,3,4,6,7,8-HpCDF-13C		1.2491	1.2217	1.0875	1.2280	1.2341
1,2,3,4,7,8,9-HpCDF-13C		0.9880	1.0006	0.8771	0.9634	1.0185
1,2,3,4,6,7,8-HpCDD-13C		1.0980	1.0766	0.9822	1.0556	1.0983
OCDD-13C		0.9188	0.9233	0.8338	0.9071	0.9535

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Method 1613B
Initial Calibration (ICAL) - Isotope Ratio Summary

ICAL ID	F190508	Data Files:	Time	Injected
Calibration Date	05/08/2019	CS-1	F190508A_04	11:43
Instrument	10MSHR05 (F)	CS-2	F190508A_03	11:02
Column Phase	ZB5-MS 0.25mm	CS-3	F190508A_02	10:00
Column ID No.	ZB5-MS-629919	CS-4	F190508A_06	13:46
		CS-5	F190508A_05	13:05

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Limits
2,3,7,8-TCDF	0.76	0.79	0.75	0.76	0.78	0.65 - 0.89
2,3,7,8-TCDD	0.79	0.75	0.82	0.76	0.78	0.65 - 0.89
1,2,3,7,8-PeCDF	1.54	1.53	1.61	1.54	1.58	1.32 - 1.78
2,3,4,7,8-PeCDF	1.53	1.60	1.54	1.55	1.54	1.32 - 1.78
1,2,3,7,8-PeCDD	0.55	0.62	0.61	0.61	0.62	0.52 - 0.70
1,2,3,4,7,8-HxCDF	1.30	1.29	1.28	1.26	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDF	1.22	1.30	1.21	1.26	1.24	1.05 - 1.43
2,3,4,6,7,8-HxCDF	1.27	1.19	1.22	1.24	1.23	1.05 - 1.43
1,2,3,7,8,9-HxCDF	1.43	1.23	1.26	1.21	1.23	1.05 - 1.43
1,2,3,4,7,8-HxCDD	1.26	1.33	1.23	1.24	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDD	1.23	1.25	1.21	1.22	1.22	1.05 - 1.43
1,2,3,7,8,9-HxCDD	1.25	1.26	1.21	1.22	1.19	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF	1.05	1.00	1.01	1.02	1.03	0.88 - 1.20
1,2,3,4,7,8,9-HpCDF	0.94	1.06	1.03	1.03	1.03	0.88 - 1.20
1,2,3,4,6,7,8-HpCDD	0.95	1.04	1.00	1.00	1.04	0.88 - 1.20
OCDF	0.94	0.93	0.91	0.90	0.92	0.76 - 1.02
OCDD	0.86	0.86	0.88	0.89	0.88	0.76 - 1.02
1,2,3,4-TCDD-13C	0.79	0.79	0.79	0.78	0.78	0.65 - 0.89
1,2,3,7,8,9-HxCDD-13C	1.25	1.24	1.25	1.24	1.21	1.05 - 1.43
2,3,7,8-TCDF-13C	0.76	0.77	0.78	0.75	0.77	0.65 - 0.89
2,3,7,8-TCDD-13C	0.77	0.78	0.78	0.77	0.77	0.65 - 0.89
1,2,3,7,8-PeCDF-13C	1.61	1.56	1.57	1.56	1.57	1.32 - 1.78
2,3,4,7,8-PeCDD-13C	1.54	1.57	1.58	1.56	1.57	1.32 - 1.78
1,2,3,7,8-PeCDF-13C	1.56	1.58	1.56	1.58	1.54	1.32 - 1.78
1,2,3,4,7,8-HxCDF-13C	0.52	0.51	0.51	0.52	0.52	0.43 - 0.59
1,2,3,6,7,8-HxCDF-13C	0.54	0.51	0.50	0.53	0.52	0.43 - 0.59
2,3,4,6,7,8-HxCDF-13C	0.52	0.51	0.53	0.53	0.53	0.43 - 0.59
1,2,3,7,8,9-HxCDF-13C	0.51	0.53	0.53	0.54	0.52	0.43 - 0.59
1,2,3,4,7,8-HxCDD-13C	1.24	1.26	1.25	1.26	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDD-13C	1.26	1.25	1.25	1.26	1.23	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF-13C	0.45	0.43	0.44	0.45	0.44	0.37 - 0.51
1,2,3,4,7,8-HpCDF-13C	0.45	0.44	0.45	0.45	0.44	0.37 - 0.51
1,2,3,4,6,7,8-HpCDD-13C	1.01	1.03	1.03	1.03	1.06	0.88 - 1.20
OCDD-13C	0.89	0.91	0.88	0.91	0.90	0.76 - 1.02

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Method 1613B
Initial Calibration (ICAL) - Response Factor Summary

ICAL ID	Y190424	Data Files:			Time	Injected
Calibration Date	04/24/2019	CS-1	Y190424A_03	09:24	SMT	
Instrument	10MSHR12 (Y)	CS-2	Y190424A_02	08:38	SMT	
Column Phase	ZB-5MS 0.25mm	CS-3	Y190424A_01	07:53	SMT	
Column ID No.	629920	CS-4	Y190424A_05	11:02	SMT	
		CS-5	Y190424A_04	10:17	SMT	
Isomer		CS-1	CS-2	CS-3	CS-4	CS-5
		Ave RF	%RSD			
2,3,7,8-TCDF	0.8729	0.8432	0.8526	0.8809	0.8890	0.8677
2,3,7,8-TCDD	0.8562	0.8631	1.0213	0.9314	0.9495	0.9243
1,2,3,7,8-PeCDF	0.8497	0.8338	0.9059	0.8703	0.8977	0.8715
2,3,4,7,8-PeCDF	0.9341	0.9523	0.9597	0.9958	1.0220	0.9728
1,2,3,7,8-PeCDD	0.8708	0.8847	0.8802	0.8955	0.9296	0.8921
1,2,3,4,7,8-HxCDF	1.1439	1.0967	1.1776	1.1920	1.2166	1.1654
1,2,3,6,7,8-HxCDF	1.0426	1.0679	1.1267	1.1055	1.1348	1.0955
2,3,4,6,7,8-HxCDF	1.1427	1.1191	1.1823	1.1952	1.1819	1.1642
1,2,3,7,8,9-HxCDF	1.1115	1.0464	1.0803	1.1213	1.1439	1.1007
1,2,3,4,7,8-HxCDD	0.8497	0.8896	0.9286	0.9506	0.9602	0.9157
1,2,3,6,7,8-HxCDD	0.9208	0.9452	0.9241	0.9304	0.9459	0.9333
1,2,3,7,8,9-HxCDD	0.8968	0.8994	0.9503	0.9396	0.9360	0.9244
1,2,3,4,6,7,8-HpCDF	1.2000	1.2714	1.2416	1.2860	1.2831	1.2564
1,2,3,4,7,8,9-HpCDF	1.2820	1.2744	1.2895	1.3181	1.3172	1.2962
1,2,3,4,6,7,8-HpCDD	0.9267	0.9265	0.9872	1.0193	0.9930	0.9705
OCDF	1.1150	1.0519	1.0618	1.1832	1.1582	1.1140
OCDD	0.9688	0.9932	0.9766	1.0446	1.0045	0.9975
Total PeCDF	0.8919	0.8930	0.9328	0.9331	0.9599	0.9221
Total HxCDF	1.1101	1.0825	1.1417	1.1535	1.1693	1.1314
Total HxCDD	0.8891	0.9114	0.9343	0.9402	0.9473	0.9245
Total HpCDF	1.2410	1.2729	1.2655	1.3020	1.3002	1.2763
2,3,7,8-TCDF-13C	1.4049	1.4326	1.4451	1.3939	1.4340	1.4221
2,3,7,8-TCDD-13C	1.0663	1.1017	1.1494	1.0553	1.1115	1.0968
2,3,7,8-TCDD-37Cl4	1.0375	1.0723	1.1203	1.0857	1.1501	1.0932
1,2,3,7,8-PeCDF-13C	1.0503	1.0587	1.0139	1.0630	1.1470	1.0666
2,3,4,7,8-PeCDF-13C	1.0164	1.0405	1.0773	1.0337	1.1320	1.0600
1,2,3,7,8-PeCDD-13C	0.7177	0.7227	0.7651	0.7403	0.8302	0.7552
1,2,3,4,7,8-HxCDF-13C	1.0423	1.0440	0.8810	1.0422	0.9857	0.9990
1,2,3,6,7,8-HxCDF-13C	1.1538	1.1790	0.9850	1.1883	1.1393	1.1291
2,3,4,6,7,8-HxCDF-13C	1.1032	1.0959	0.9475	1.1004	1.0598	1.0614
1,2,3,7,8,9-HxCDF-13C	0.9479	0.9666	0.8920	0.9829	0.9583	0.9495
1,2,3,4,7,8-HxCDD-13C	0.9555	0.9770	0.8521	0.9886	0.9648	0.9476
1,2,3,6,7,8-HxCDD-13C	1.0622	1.0827	0.9902	1.0797	1.0742	1.0578
1,2,3,4,6,7,8-HpCDF-13C	1.0365	1.0626	0.9680	1.0737	1.0649	1.0411
1,2,3,4,7,8,9-HpCDF-13C	0.8316	0.8411	0.7866	0.8572	0.8769	0.8387
1,2,3,4,6,7,8-HpCDD-13C	0.8976	0.9280	0.8651	0.9239	0.9580	0.9145
OCDD-13C	0.6505	0.6988	0.6782	0.7086	0.7707	0.7014

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Method 1613B
Initial Calibration (ICAL) - Isotope Ratio Summary

ICAL ID	Y190424	Data Files:	Time	Injected	
Calibration Date	04/24/2019	CS-1	Y190424A_03	09:24	SMT
Instrument	10MSHR12 (Y)	CS-2	Y190424A_02	08:38	SMT
Column Phase	ZB-5MS 0.25mm	CS-3	Y190424A_01	07:53	SMT
Column ID No.	629920	CS-4	Y190424A_05	11:02	SMT
		CS-5	Y190424A_04	10:17	SMT

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Limits
2,3,7,8-TCDF	0.83	0.83	0.77	0.77	0.78	0.65 - 0.89
2,3,7,8-TCDD	0.83	0.80	0.76	0.77	0.77	0.65 - 0.89
1,2,3,7,8-PeCDF	1.43	1.56	1.53	1.53	1.55	1.32 - 1.78
2,3,4,7,8-PeCDF	1.53	1.60	1.54	1.59	1.56	1.32 - 1.78
1,2,3,7,8-PeCDD	0.65	0.62	0.61	0.60	0.61	0.52 - 0.70
1,2,3,4,7,8-HxCDF	1.26	1.27	1.26	1.27	1.27	1.05 - 1.43
1,2,3,6,7,8-HxCDF	1.26	1.30	1.26	1.27	1.29	1.05 - 1.43
2,3,4,6,7,8-HxCDF	1.26	1.27	1.26	1.28	1.25	1.05 - 1.43
1,2,3,7,8,9-HxCDF	1.16	1.18	1.26	1.25	1.26	1.05 - 1.43
1,2,3,4,7,8-HxCDD	1.18	1.22	1.24	1.24	1.22	1.05 - 1.43
1,2,3,6,7,8-HxCDD	1.30	1.26	1.25	1.23	1.23	1.05 - 1.43
1,2,3,7,8,9-HxCDD	1.31	1.24	1.26	1.23	1.22	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF	1.14	1.11	1.04	1.04	1.03	0.88 - 1.20
1,2,3,4,7,8,9-HpCDF	0.96	1.11	1.00	1.05	1.02	0.88 - 1.20
1,2,3,4,6,7,8-HpCDD	1.03	1.05	1.05	1.03	1.05	0.88 - 1.20
OCDF	0.85	0.88	0.91	0.87	0.90	0.76 - 1.02
OCDD	0.76	0.91	0.88	0.88	0.89	0.76 - 1.02
1,2,3,4-TCDD-13C	0.78	0.78	0.79	0.78	0.80	0.65 - 0.89
1,2,3,7,8,9-HxCDD-13C	1.24	1.25	1.23	1.25	1.24	1.05 - 1.43
2,3,7,8-TCDF-13C	0.79	0.78	0.76	0.76	0.77	0.65 - 0.89
2,3,7,8-TCDD-13C	0.79	0.77	0.79	0.78	0.78	0.65 - 0.89
1,2,3,7,8-PeCDF-13C	1.53	1.56	1.55	1.56	1.57	1.32 - 1.78
2,3,4,7,8-PeCDF-13C	1.54	1.54	1.55	1.57	1.55	1.32 - 1.78
1,2,3,7,8-PeCDD-13C	1.56	1.55	1.59	1.59	1.61	1.32 - 1.78
1,2,3,4,7,8-HxCDF-13C	0.52	0.51	0.52	0.51	0.52	0.43 - 0.59
1,2,3,6,7,8-HxCDF-13C	0.52	0.51	0.54	0.51	0.51	0.43 - 0.59
2,3,4,6,7,8-HxCDF-13C	0.51	0.52	0.50	0.51	0.51	0.43 - 0.59
1,2,3,7,8,9-HxCDF-13C	0.52	0.53	0.52	0.50	0.50	0.43 - 0.59
1,2,3,4,7,8-HxCDD-13C	1.26	1.25	1.25	1.26	1.26	1.05 - 1.43
1,2,3,6,7,8-HxCDD-13C	1.23	1.21	1.22	1.25	1.24	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF-13C	0.45	0.45	0.45	0.44	0.44	0.37 - 0.51
1,2,3,4,7,8-HpCDF-13C	0.44	0.45	0.46	0.44	0.45	0.37 - 0.51
1,2,3,4,6,7,8-HpCDD-13C	1.04	1.01	1.04	1.03	1.03	0.88 - 1.20
OCDD-13C	0.88	0.91	0.89	0.88	0.89	0.76 - 1.02

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**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Labeled Analytes**

Lab Name CS3/CPM-11321-155
Filename F190522A_01
Injected By SMT
Analyzed 05/22/2019 08:15

Instrument ID 10MSHR05 (F)
GC Column ID ZB5-MS-629919
ICAL ID F190508

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.80	0.65 - 0.89	----	----
2,3,7,8-TCDD-13C	M/M+2	0.77	0.65 - 0.89	102.8	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.62	1.32 - 1.78	92.6	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.25	1.05 - 1.43	86.5	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.27	1.05 - 1.43	93.1	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.28	1.05 - 1.43	----	----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.07	0.88 - 1.20	79.1	72 - 138
OCDD-13C	M+2/M+4	0.90	0.76 - 1.02	169.8	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.77	0.65 - 0.89	110.9	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.58	1.32 - 1.78	93.9	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.62	1.32 - 1.78	100.6	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.53	0.43 - 0.59	94.6	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.53	0.43 - 0.59	97.5	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.55	0.43 - 0.59	100.5	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.53	0.43 - 0.59	98.0	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.44	0.37 - 0.51	81.6	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.45	0.37 - 0.51	83.7	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		10.3	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).
4. No ion abundance ratio; report concentration found.

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Native Analytes**

Lab Name CS3/CPM-11321-155
Filename F190522A_01
Injected By SMT
Analyzed 05/22/2019 08:15

Instrument ID 10MSHR05 (F)
GC Column ID ZB5-MS-629919
ICAL ID F190508

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.78	0.65 - 0.89	11.6	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.60	0.52 - 0.70	54.0	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.26	1.05 - 1.43	53.1	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.26	1.05 - 1.43	53.3	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.27	1.05 - 1.43	54.7	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.02	0.88 - 1.20	50.4	43 - 58
OCDD	M+2/M+4	0.90	0.76 - 1.02	101.8	79 - 126
2,3,7,8-TCDF	M/M+2	0.78	0.65 - 0.89	10.4	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.57	1.32 - 1.78	56.4	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.58	1.32 - 1.78	53.7	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.24	1.05 - 1.43	50.5	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.24	1.05 - 1.43	52.4	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.25	1.05 - 1.43	51.1	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.29	1.05 - 1.43	52.9	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	1.02	0.88 - 1.20	52.2	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.02	0.88 - 1.20	51.3	43 - 58
OCDF	M+2/M+4	0.90	0.76 - 1.02	106.1	63 - 159

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

REPORT OF LABORATORY ANALYSIS

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1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Labeled Analytes**

Lab Name CS3/CPM-11321-155
Filename Y190523A_05
Injected By SMT
Analyzed 05/23/2019 11:00

Instrument ID 10MSHR12 (Y)
GC Column ID 629920
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.80	0.65 - 0.89	----	----
2,3,7,8-TCDD-13C	M/M+2	0.79	0.65 - 0.89	103.6	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.57	1.32 - 1.78	97.5	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.26	1.05 - 1.43	91.5	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.24	1.05 - 1.43	91.5	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.24	1.05 - 1.43	----	----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.05	0.88 - 1.20	94.6	72 - 138
OCDD-13C	M+2/M+4	0.91	0.76 - 1.02	190.1	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.77	0.65 - 0.89	101.1	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.55	1.32 - 1.78	95.3	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.57	1.32 - 1.78	101.5	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	102.8	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	97.9	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	93.8	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	96.1	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.45	0.37 - 0.51	95.9	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.45	0.37 - 0.51	99.7	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		10.1	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).
4. No ion abundance ratio; report concentration found.

REPORT OF LABORATORY ANALYSIS

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1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Native Analytes**

Lab Name CS3/CPM-11321-155
Filename Y190523A_05
Injected By SMT
Analyzed 05/23/2019 11:00

Instrument ID 10MSHR12 (Y)
GC Column ID 629920
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.78	0.65 - 0.89	11.6	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.62	0.52 - 0.70	51.6	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.21	1.05 - 1.43	52.2	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.20	1.05 - 1.43	49.4	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.22	1.05 - 1.43	52.5	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.09	0.88 - 1.20	53.2	43 - 58
OCDD	M+2/M+4	0.92	0.76 - 1.02	101.3	79 - 126
2,3,7,8-TCDF	M/M+2	0.75	0.65 - 0.89	10.1	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.60	1.32 - 1.78	53.4	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.54	1.32 - 1.78	50.6	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.28	1.05 - 1.43	49.2	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.27	1.05 - 1.43	50.7	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.23	1.05 - 1.43	50.5	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.21	1.05 - 1.43	50.4	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	1.05	0.88 - 1.20	52.0	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.04	0.88 - 1.20	51.9	43 - 58
OCDF	M+2/M+4	0.89	0.76 - 1.02	109.8	63 - 159

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

REPORT OF LABORATORY ANALYSIS

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Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Labeled Analytes**

Lab Name CS3/CPM-11321-155
Filename Y190524A_01
Injected By ZMS
Analyzed 05/24/2019 12:56

Instrument ID 10MSHR12 (Y)
GC Column ID 629920
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.79	0.65 - 0.89	----	----
2,3,7,8-TCDD-13C	M/M+2	0.77	0.65 - 0.89	103.5	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.56	1.32 - 1.78	98.5	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.25	1.05 - 1.43	90.7	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.25	1.05 - 1.43	91.7	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.24	1.05 - 1.43	----	----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.05	0.88 - 1.20	117.7	72 - 138
OCDD-13C	M+2/M+4	0.90	0.76 - 1.02	249.2	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.78	0.65 - 0.89	96.0	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.55	1.32 - 1.78	92.8	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.56	1.32 - 1.78	97.3	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	95.7	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	90.3	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	87.6	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	88.8	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.44	0.37 - 0.51	102.4	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.44	0.37 - 0.51	112.1	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		9.8	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).
4. No ion abundance ratio; report concentration found.

REPORT OF LABORATORY ANALYSIS

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1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Native Analytes**

Lab Name CS3/CPM-11321-155
Filename Y190524A_01
Injected By ZMS
Analyzed 05/24/2019 12:56

Instrument ID 10MSHR12 (Y)
GC Column ID 629920
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.76	0.65 - 0.89	11.0	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.60	0.52 - 0.70	49.1	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.24	1.05 - 1.43	49.6	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.21	1.05 - 1.43	47.1	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.19	1.05 - 1.43	49.5	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.01	0.88 - 1.20	48.5	43 - 58
OCDD	M+2/M+4	0.90	0.76 - 1.02	97.8	79 - 126
2,3,7,8-TCDF	M/M+2	0.76	0.65 - 0.89	9.5	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.53	1.32 - 1.78	49.3	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.52	1.32 - 1.78	46.5	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.23	1.05 - 1.43	46.4	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.25	1.05 - 1.43	48.7	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.26	1.05 - 1.43	47.7	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.25	1.05 - 1.43	47.1	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	1.06	0.88 - 1.20	48.6	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.02	0.88 - 1.20	49.3	43 - 58
OCDF	M+2/M+4	0.91	0.76 - 1.02	90.5	63 - 159

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

REPORT OF LABORATORY ANALYSIS

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Report Prepared for:

Benita Miller
Pace Analytical National
12065 Lebanon Road
Mount Juliet TN 37122

**REPORT OF
LABORATORY
ANALYSIS
FOR PFAAs****Report Prepared Date:**

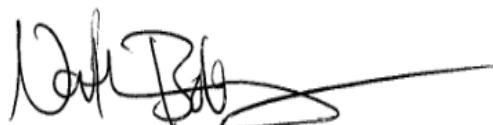
June 6, 2019

Report Information:

Pace Project #: 10474760
Sample Receipt Date: 05/14/2019
Client Project #: L1098246: WG1280338
Client Sub PO #: N/A
State Cert #: 2926.01

Invoicing & Reporting Options:

This report has been reviewed by:



June 06, 2019

Nathan Boberg, Project Manager
612-360-0728
(612) 607-6444 (fax)
nathan.boberg@pacelabs.com

**Report of Laboratory Analysis**

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The results relate only to the samples included in this report.

DISCUSSION

This report presents the results from the analyses performed on one sample submitted by a representative of Pace-National. The sample was analyzed for one perfluorinated compound using a modified version of USEPA Method 537 Rev. 1.1. Reporting limits were set to the quantitation limits.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank was free of the target perfluorinated compound (PFOS) at the reporting limit. This indicates that the sample processing procedure did not significantly contribute to the analyte content determined for the sample material.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standards. The recovery results were within the method limits. The RPDs (relative percent differences) between one designated spike and its duplicate were within the method limits. These spikes indicate that extraction was performed as expected.

The recoveries of the isotopically-labeled surrogate standards in the sample extract was within the target ranges specified in the method.

It should be noted that Pace Analytical has not yet completed the certification process for all analytes in this method. Therefore, the results have been marked "N2" as qualified. Results for the low level spikes that were below the calibration range were flagged "J".



Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

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Reporting Flags

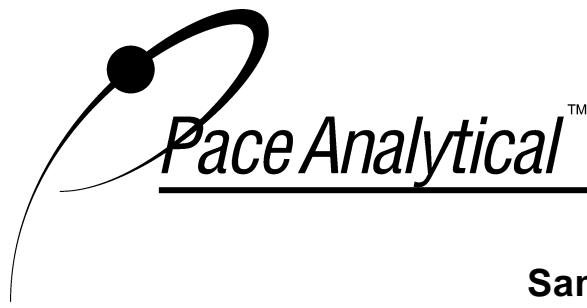
- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- L = Suppressive interference, analyte may be biased low
- Nn = Value obtained from additional analysis
- P = PCDEInterference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- * = See Discussion

REPORT OF LABORATORY ANALYSIS

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Appendix A

Sample Management



Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Sample ID Cross Reference

Client Sample ID

WW-20190511-002-DAY 9

Pace Sample ID

10474760001

Date Received

05/14/2019

Sample Type

Water

REPORT OF LABORATORY ANALYSIS

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WO# : 10474760



Sub-Contract Chain of Custody

Batch Date/Time: 05/13/19 13:57

Sub-Contract Lab: PACEMN

Address: 1700 Elm Street Suite 200

City/State: Minneapolis, MN 55414

Contact:

Nathan.Boberg@pacelabs.com

WO: WG1280338

Results Due Date: 05/28/19

ESC Purchase Order #: L1098246

Send Reports to: Benita Miller

Email: SuboutTeam@esclabsciences.com



12065 Lebanon Rd.

Mt. Juliet, TN 37122

call:(615)773-9756

Sample ID Container ID	Matrix	State	Collect Date	Sample Number Lab Use Only	Sample Comments Lab Use Only
W-20190511-002-DAY 9	GW	DE	05/11/19 11:30	L1098246-01	EPA 1613 and EPA 537 001

Relinquished by: Steve Miller Date 5/13/19
Received by: Carey Pace Date 5/14/19 0945 T=3.9

Relinquished by: _____ Date: _____
Received by: _____ Date: _____



Document Name:
Sample Condition Upon Receipt Form
Document No.:
F-MN-L-213-rev.28

Document Revised: 09May2019
Page 1 of 1
Issuing Authority:
Pace Minnesota Quality Office

Sample Condition Upon Receipt	Client Name:	Project #:	WO# : 10474760
Courier:	<input checked="" type="checkbox"/> FedEx <input type="checkbox"/> UPS <input type="checkbox"/> USPS <input type="checkbox"/> Client <input type="checkbox"/> Pace <input type="checkbox"/> SpeeDee <input type="checkbox"/> Commercial See Exception	PM: NB3	Due Date: 05/29/19
Tracking Number:	1023 1351 3475	CLIENT: ESC_TN	
Custody Seal on Cooler/Box Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Seals Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Packing Material:	<input checked="" type="checkbox"/> Bubble Wrap <input type="checkbox"/> Bubble Bags <input type="checkbox"/> None <input checked="" type="checkbox"/> Other: PB	Temp Blank?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Thermometer:	<input type="checkbox"/> T1(0461) <input type="checkbox"/> T2(1836) <input checked="" type="checkbox"/> T3(0459) <input type="checkbox"/> T4(0254) <input type="checkbox"/> T5(0489)	Type of Ice:	<input checked="" type="checkbox"/> Wet <input type="checkbox"/> Blue <input type="checkbox"/> None <input type="checkbox"/> Dry <input type="checkbox"/> Melted
Note: Each West Virginia Sample must have temp taken (no temp blanks)			
Temp should be above freezing to 6°C	Cooler Temp Read w/temp blank: _____ °C		Average Corrected Temp. See Exceptions (no temp blank only): <u>3.6</u> °C
Correction Factor: +0.2	Cooler Temp Corrected w/temp blank: _____ °C		Date/Initials of Person Examining Contents: CG 5/14/19
USDA Regulated Soil: (<input type="checkbox"/> N/A, water sample/Other: _____)		Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? <input type="checkbox"/> Yes <input type="checkbox"/> No	
		Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.			
COMMENTS:			
Chain of Custody Present and Filled Out?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.	
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.	
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	3.	
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4.	
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other	
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.	
Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.	
Correct Containers Used? -Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	8.	
Containers Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.	
Field Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Is sufficient information available to reconcile the samples to the COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	11. If no, write ID/ Date/Time on Container Below: See Exception <input type="checkbox"/>	
Matrix: <input checked="" type="checkbox"/> Water <input type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other			
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12. Sample #	
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO ₃ , H ₂ SO ₄ , <2pH, NaOH>9 Sulfide, NaOH>12 Cyanide)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> NaOH <input type="checkbox"/> HNO ₃ <input type="checkbox"/> H ₂ SO ₄ <input type="checkbox"/> Zinc Acetate	
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Positive for Res. <input type="checkbox"/> Yes Chlorine? <input type="checkbox"/> No pH Paper Lot# <input type="checkbox"/> Res. Chlorine 0-6 Roll 0-6 Strip 0-14 Strip	
Headspace in VOA Vials (greater than 6mm)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	13. See Exception <input type="checkbox"/>	
Trip Blank Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	14. Pace Trip Blank Lot # (if purchased): <u>N/A</u>	
CLIENT NOTIFICATION/RESOLUTION		Field Data Required? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Person Contacted:	Date/Time:		
Comments/Resolution:	This workorder references method 537M, PFOS only.		

Project Manager Review: Lathan Roberts Date: 5/16/19
Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: _____



Document Name:
SCUR Exception Form – Coolers Above 6°C

Document Revised: 08Apr2019

Page 1 of 1

Document No.:
F-MN-C-298-Rev.02

Issuing Authority:
Pace Minnesota Quality Office

During sample triage, this form is to be placed in each cooler that arrives above 6.0 degrees Celsius

SCUR Exceptions:

Workorder #:

Tracking Number/Temperature

pH Adjustment Log for Preserved Samples

pH Adjustment Log for Preserved Samples									
Sample ID	Type of Preserv.	pH Upon Receipt	Date Adjusted	Time Adjusted	Amount Added (mL)	Lot # Added	pH After	In Compliance after addition?	Initials
								<input type="checkbox"/> Yes <input type="checkbox"/> No	
								<input type="checkbox"/> Yes <input type="checkbox"/> No	
								<input type="checkbox"/> Yes <input type="checkbox"/> No	
								<input type="checkbox"/> Yes <input type="checkbox"/> No	

QC Matric lot #: 186509
Time of Spiking: 05/20/19 15:30
SPE Cartridge: S322-0024
Balance: 10BALQ

TRIZMA Lot #: 183004/18F285
Optima H2O Lot #: 187814
Methanol Lot #: 187805

Extract Start: 05/21/19 16:00
Extract End: 05/21/19 17:30
Setup By: QL/PY

	Lot Number	Amount	Initials	Expiration	Dispenser	Witness
Internal	12332-190	100	NH	11/22/19	Q503	py
Surrogate	12332-187	100	PY	11/10/19	Q523	QL
Native Lo	12332-167	10	PY	10/19/19	Q523	QL
Native Mid	12332-167	100	PY	10/19/19	Q523	QL
Native Hi						
GenX IS	12332-175	200	PY	10/25/19	Q497	QL

#	Sample ID	GenX IS	Surrogate	Natives	Full Bottle Weight	Empty Bottle Weight	Amount Extracted	Comments
1	BLANK-70627	X	X		297.5	36.7	260.8	
2	LCS-70628	X	X	X	296.5	36.7	259.8	
3	LCS-70629	X	X	X	294.2	36.2	258.0	
4	LCSD-70630	X	X	X	297.3	36.6	260.7	
5	10474759001	X	X		281.2	37.3	243.9	
6	10474759002	X	X		279.5	37.0	242.4	
7	10474760001	X	X		280.4	37.1	243.3	
8	10474998001	X	X		286.8	36.9	249.9	
9	10474998002	X	X		285.4	37.0	248.4	
10	10474998003	X	X		280.9	36.7	244.1	
11	10474998004	X	X		293.2	37.1	256.1	
12	10474998005	X	X		63.3	13.0	50.3	
13	10474998006	X	X		286.6	37.5	249.0	
14	10474998007	X	X		280.6	36.9	243.8	
15	10474998008	X	X		295.0	37.0	258.0	
16	10474998009	X	X		294.5	38.6	255.9	
17	10475035006	X	X		276.4	36.6	239.8	
18	10475035007	X	X		285.5	38.5	246.9	
19	10475346001	X	X		281.6	37.2	244.5	
20	10474759002-DUP	X	X		280.8	37.2	243.6	
21	10473429008-R	X	X		288.5	36.7	251.8	
22	10473429009-R	X	X		288.8	36.7	252.2	



EB-24629

Appendix B

Sample Analysis Summary



Pace Analytical Services, LLC

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Method 537 (Modified)
Sample Analysis Summary

Client's Sample ID	WW-20190511-002-DAY 9	Date Extracted	05/21/2019
Lab Sample ID	10474760001	Total Amount Extracted	243 mL
Filename	B190528C_010	ICAL ID	190528A02
Matrix	Water	Starting CCal	B190528C_002
Collected	05/11/2019	Ending CCal	B190528C_015
Received	05/14/2019	Method Blank Filename	B190523C_008

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFOS	2.9	2.0	0.64	1	05/29/2019 00:36	1763-23-1	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	92	70 - 130	Pass
13C2_PFDA	2.0	2.0	98	70 - 130	Pass
d5-EtFOSAA	8.0	7.4	93	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPOPrA	209159	112299 - 336896	151810 - 303619	Pass
13C2_PFOA	461820	213002 - 639005	296454 - 592909	Pass
13C4_PFOS	558063	281769 - 845307	406632 - 813263	Pass
d3-MeFOSAA	381498	170979 - 512936	234675 - 469350	Pass

50-150% of Ical area

70-140% of the preceding CCV area

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

Appendix C

QC and Calibration Results Summary



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Method 537 (Modified) Blank Analysis Summary

Lab Sample ID	BLANK-70627	Total Amount Extracted	261 mL
Filename	B190523C_008	ICAL ID	190522A02
Matrix	Water	Starting CCal	B190523C_004
Date Extracted	05/21/2019	Ending CCal	B190523C_017

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
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PFOS	ND	1.8	0.60	1	05/23/2019 21:56	1763-23-1	N2
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Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	84	70 - 130	Pass
13C2_PFDA	2.0	2.3	114	70 - 130	Pass
d5-EtFOSAA	8.0	8.4	105	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPOPrA	116678	57101 - 171302	75023 - 150045	Pass
13C2_PFOA	427657	177885 - 533654	274161 - 548322	Pass
13C4_PFOS	589826	262955 - 788866	396931 - 793862	Pass
d3-MeFOSAA	144621	71669 - 215006	116571 - 233141	Pass

50-150% of Ical area

70-140% of the preceding CCV area

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.



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Method 537 (Modified) Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-70628	Matrix	Water
LCS Filename	B190523C_009	Dilution	1
Total Amount Extracted	260mL	Extracted	05/21/2019
ICAL ID	190522A02	Analyzed	05/23/2019 22:08
Start CCal Filename	B190523C_004	Injected By	WM
End CCal Filename	B190523C_017		
Method Blank Filename	B190523C_008		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFOS	1.8	1.6 J	85	50.0 - 150.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	94	70 - 130	Pass
13C2_PFDA	2.0	2.3	116	70 - 130	Pass
d5-EtFOSAA	8.0	7.9	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	114514	57101 - 171302	75023 - 150045	Pass
13C2_PFOA	406367	177885 - 533654	274161 - 548322	Pass
13C4_PFOS	608542	262955 - 788866	396931 - 793862	Pass
d3-MeFOSAA	145122	71669 - 215006	116571 - 233141	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-70629	Matrix	Water
LCS Filename	B190523C_010	Dilution	1
Total Amount Extracted	258mL	Extracted	05/21/2019
ICAL ID	190522A02	Analyzed	05/23/2019 22:19
Start CCal Filename	B190523C_004	Injected By	WM
End CCal Filename	B190523C_017		
Method Blank Filename	B190523C_008		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFOS	19	17	92	70.0 - 130.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	89	70 - 130	Pass
13C2_PFDA	2.0	2.3	116	70 - 130	Pass
d5-EtFOSAA	8.0	8.1	101	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	104331	57101 - 171302	75023 - 150045	Pass
13C2_PFOA	408849	177885 - 533654	274161 - 548322	Pass
13C4_PFOS	602997	262955 - 788866	396931 - 793862	Pass
d3-MeFOSAA	144929	71669 - 215006	116571 - 233141	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Laboratory Control Sample Duplicate (LCSD)

LCSD Lab Sample ID	LCSD-70630	LCS Filename	B190523C_010
LCSD Filename	B190523C_011	Matrix	Water
Total Amount Extracted	261mL	Dilution	1
ICAL ID	190522A02	Extracted	05/21/2019
Start CCal Filename	B190523C_004	Analyzed	05/23/2019 22:31
End CCal Filename	B190523C_017	Injected By	WM
Method Blank Filename	B190523C_008		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Recovery Limits	RPD %
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PFOS	18	19	103	70.0 - 130.0	10
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Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	88	70 - 130	Pass
13C2_PFDA	2.0	2.2	109	70 - 130	Pass
d5-EtFOSAA	8.0	8.0	100	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	88281	57101 - 171302	75023 - 150045	Pass
13C2_PFOA	420292	177885 - 533654	274161 - 548322	Pass
13C4_PFOS	579577	262955 - 788866	396931 - 793862	Pass
d3-MeFOSAA	147502	71669 - 215006	116571 - 233141	Pass

50-150% of Ical area

70-140% of the preceding CCV area

**PFAA Initial Calibration Response Factor Summary**

ICAL ID	190522A02	Data Files:	CS-1	B190522A_004	08:06
Calibration Date	05/22/2019		CS-2	B190522A_005	08:18
Instrument	10LCMS02		CS-3	B190522A_006	08:30
Column Phase	C18		CS-4	B190522A_007	08:41
Column ID No.	H18-061776		CS-5	B190522A_008	08:53
Analyst	NH		CS-6	B190522A_009	09:05

Response Factors

Compound	Type	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	Slope	R ²
13C3_PFPrOPrA	L	8150	7480	7260	6950	6700	6290	7140	0.993
13C2_PFOA	L	168000	180000	181000	181000	179000	178000	178000	0.999
13C4_PFOS	L	91000	91400	95500	91600	88800	91400	91600	1.000
d3-MeFOSAA	L	17800	18700	16700	18000	18700	17600	17900	0.999
13C2_PFHxA	L	1.31	1.21	1.18	1.22	1.22	1.20	1.22	0.999
13C2_PFDA	L	9.29	8.38	9.47	8.99	8.05	8.56	8.79	0.997
d5-EtFOSAA	L	0.838	0.758	0.821	0.788	0.758	0.774	0.789	0.999
PFBA	L	1.03	0.908	0.938	0.952	0.947	0.926	0.932	1.000
PFPeA	L	1.16	1.04	1.09	1.11	1.08	1.03	1.04	0.999
PFBS	L	0.605	0.537	0.548	0.552	0.560	0.537	0.542	1.000
PFHxA	L	1.24	1.10	1.14	1.12	1.09	1.07	1.08	1.000
PFPrOPrA	L	1.73	1.64	1.61	1.71	1.67	1.75	1.73	1.000
PFHpA	L	1.16	1.08	1.11	1.14	1.14	1.04	1.07	0.998
NaDONA	L	24.3	27.7	29.1	29.6	29.8	28.8	29.0	1.000
PFHxS	L	0.485	0.396	0.434	0.431	0.421	0.433	0.431	1.000
PFOA	L	1.02	0.939	0.970	0.998	0.992	0.938	0.951	0.999
PFNA	L	1.60	1.66	1.62	1.71	1.73	1.61	1.64	0.999
PFOS	L	1.10	1.02	0.977	1.08	1.07	1.02	1.03	0.999
PFDA	L	6.81	6.79	8.17	7.49	7.20	7.21	7.23	1.000
PFUdA	L	10.8	10.9	12.0	10.9	10.4	10.8	10.8	1.000
N-MeFOSAA	L	0.990	0.970	1.16	1.07	1.05	1.09	1.08	1.000
N-EtFOSAA	L	1.10	1.12	1.26	1.19	1.14	1.14	1.14	1.000
PFDS	L	5.33	5.22	5.95	5.53	5.19	5.50	5.45	0.999
PFDoA	L	6.14	6.01	6.86	6.77	6.12	6.64	6.55	0.999
PFTrDA	L	6.21	5.78	7.19	6.92	6.79	6.91	6.89	1.000
PFTeDA	L	1.98	1.95	2.22	2.06	2.05	2.10	2.09	1.000
PFHxDA	L	3.64	3.21	3.69	3.54	3.41	3.75	3.67	0.999
PFODA	L	1.70	1.58	1.84	1.83	1.76	1.80	1.79	1.000

Slope: Linear calibration

**PFAA Initial Calibration Recovery Summary**

ICAL ID	190522A02	Data Files:	CS-1	B190522A_004	08:06
Calibration Date	05/22/2019		CS-2	B190522A_005	08:18
Instrument	10LCMS02		CS-3	B190522A_006	08:30
Column Phase	C18		CS-4	B190522A_007	08:41
Column ID No.	H18-061776		CS-5	B190522A_008	08:53
Analyst	NH		CS-6	B190522A_009	09:05

%Recoveries

Compound	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6
13C3_PFPtOPrA	114	105	102	97	94	88
13C2_PFOA	94	101	102	102	101	100
13C4_PFOS	99	100	104	100	97	100
d3-MeFOSAA	100	104	93	101	104	98
13C2_PFHxA	107	99	97	100	99	98
13C2_PFDA	106	95	108	102	92	97
d5-EtFOSAA	106	96	104	100	96	98
PFBA	111	97	101	102	102	99
PFPeA	111	100	104	106	104	99
PFBS	112	99	101	102	103	99
PFHxA	115	102	106	104	101	99
PFPrOPrA	100	95	93	99	97	101
PFHpA	108	101	105	107	107	98
NaDONA	84	95	100	102	103	99
PFHxS	113	92	101	100	98	101
PFOA	107	99	102	105	104	99
PFNA	98	101	99	105	106	98
PFOS	107	99	95	104	104	99
PFDA	94	94	113	104	100	100
PFUdA	100	101	111	101	97	101
N-MeFOSAA	91	90	107	99	97	101
N-EtFOSAA	96	98	110	104	100	100
PFDS	98	96	109	101	95	101
PFDoA	94	92	105	103	93	101
PFTrDA	90	84	104	100	99	100
PFTeDA	95	93	106	99	98	101
PFHxDA	99	87	100	96	93	102
PFODA	95	88	103	102	98	100



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Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID ICV-12332-189
Run File Name B190522A_011
Injected By WM
Analyzed 05/22/2019 09:28
Instrument ID 10LCMS02
Column ID H18-061776
Ical ID 190522A02

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	18	97	70.0-130.0	447827

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	97	70 - 130	Pass
13C2_PFDA	2.0	2.1	105	70 - 130	Pass
d5-EtFOSAA	8.0	7.8	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPnOPrA	100665	57101 - 171302	---	Pass
13C2_PFOA	380314	177885 - 533654	---	Pass
13C4_PFOS	538861	262955 - 788866	---	Pass
d3-MeFOSAA	150404	71669 - 215006	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area

**PFAA Initial Calibration Response Factor Summary**

ICAL ID	190528A02	Data Files:	CS-1	B190528A_008	09:18
Calibration Date	05/28/2019		CS-2	B190528A_009	09:30
Instrument	10LCMS02		CS-3	B190528A_003	08:20
Column Phase	C18		CS-4	B190528A_004	08:31
Column ID No.	H18-061776		CS-5	B190528A_005	08:43
Analyst	NH		CS-6	B190528A_006	08:55

Response Factors

Compound	Type	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	Slope	R ²
13C3_PFPrOPrA	L	14900	14000	13400	14100	13700	14100	14000	0.999
13C2_PFOA	L	216000	216000	214000	212000	217000	204000	213000	1.000
13C4_PFOS	L	100000	102000	98900	96600	96600	94500	98200	0.999
d3-MeFOSAA	L	42900	44200	43400	42300	41900	41700	42700	1.000
13C2_PFHxA	L	1.14	1.11	1.13	1.13	1.09	1.13	1.12	1.000
13C2_PFDA	L	5.18	5.04	5.41	5.26	5.36	5.08	5.22	0.999
d5-EtFOSAA	L	0.866	0.804	0.770	0.761	0.796	0.749	0.791	0.998
PFBA	L	1.01	0.895	0.906	0.915	0.855	0.881	0.878	1.000
PFPeA	L	1.02	1.01	1.03	1.01	0.968	0.977	0.978	1.000
PFBS	L	0.469	0.430	0.451	0.440	0.432	0.445	0.442	1.000
PFHxA	L	1.12	1.06	1.06	1.05	1.02	1.02	1.03	1.000
PFPrOPrA	L	1.79	1.54	1.48	1.36	1.39	1.26	1.29	0.998
PFHpA	L	1.16	1.05	1.09	1.10	0.993	1.02	1.02	1.000
NaDONA	L	17.6	17.3	18.6	17.0	17.3	14.9	15.5	0.995
PFHxS	L	0.369	0.357	0.361	0.358	0.352	0.363	0.361	1.000
PFOA	L	0.975	0.969	1.00	0.982	0.934	0.943	0.944	1.000
PFNA	L	1.90	1.87	1.77	1.82	1.86	1.72	1.75	0.999
PFOS	L	0.986	0.992	1.07	1.10	1.03	1.02	1.03	1.000
PFDA	L	4.20	4.09	4.42	4.43	4.31	4.08	4.15	0.999
PFUdA	L	7.57	6.71	7.21	7.17	7.12	6.53	6.68	0.998
N-MeFOSAA	L	1.12	1.06	1.12	1.06	1.09	1.09	1.09	1.000
N-EtFOSAA	L	1.25	1.14	1.16	1.12	1.19	1.08	1.10	0.998
PFDS	L	2.69	2.47	2.53	2.55	2.64	2.55	2.56	1.000
PFDoA	L	4.82	4.75	4.97	4.86	4.89	4.67	4.73	1.000
PFTrDA	L	5.18	4.60	4.97	4.95	4.82	4.61	4.67	0.999
PFTeDA	L	1.86	1.74	1.86	1.87	1.93	1.85	1.87	1.000
PFHxDA	L	3.34	2.94	3.41	3.53	3.31	3.26	3.28	1.000
PFODA	L	1.54	1.53	1.60	1.70	1.62	1.62	1.62	1.000

Slope: Linear calibration

**PFAA Initial Calibration Recovery Summary**

ICAL ID	190528A02	Data Files:	CS-1	B190528A_008	09:18
Calibration Date	05/28/2019		CS-2	B190528A_009	09:30
Instrument	10LCMS02		CS-3	B190528A_003	08:20
Column Phase	C18		CS-4	B190528A_004	08:31
Column ID No.	H18-061776		CS-5	B190528A_005	08:43
Analyst	NH		CS-6	B190528A_006	08:55

%Recoveries

Compound	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6
13C3_PFPPrOPrA	106	100	96	100	98	100
13C2_PFOA	101	101	101	99	102	96
13C4_PFOS	102	104	101	98	98	96
d3-MeFOSAA	100	103	102	99	98	98
13C2_PFHxA	102	99	101	101	97	101
13C2_PFDA	99	96	104	101	103	97
d5-EtFOSAA	110	102	97	96	101	95
PFBA	115	102	103	104	97	100
PFPeA	104	104	105	103	99	100
PFBS	106	97	102	99	98	101
PFHxA	109	103	104	103	100	100
PFPrOPrA	139	119	114	105	107	98
PFHpA	114	103	107	108	98	100
NaDONA	114	111	120	110	111	96
PFHxS	102	99	100	99	98	101
PFOA	103	103	106	104	99	100
PFNA	109	107	101	104	106	98
PFOS	96	97	104	107	101	99
PFDA	101	99	107	107	104	98
PFUdA	113	100	108	107	107	98
N-MeFOSAA	103	97	102	98	100	100
N-EtFOSAA	113	103	106	102	108	98
PFDS	105	96	99	100	103	99
PFDoA	102	100	105	103	103	99
PFTrDA	111	99	106	106	103	99
PFTeDA	99	93	99	100	103	99
PFHxDA	102	90	104	108	101	99
PFODA	95	94	99	105	100	100



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Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID	ICV-12332-189	Instrument ID	10LCMS02
Run File Name	B190528A_010	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/28/2019 09:42		

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	19	97	70.0-130.0	471810

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	96	70 - 130	Pass
13C2_PFDA	2.0	2.0	99	70 - 130	Pass
d5-EtFOSAA	8.0	8.3	104	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	223888	112299 - 336896	---	Pass
13C2_PFOA	440105	213002 - 639005	---	Pass
13C4_PFOS	568125	281769 - 845307	---	Pass
d3-MeFOSAA	346021	170979 - 512936	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID ICV-12332-189
Run File Name B190522A_011
Injected By WM
Analyzed 05/22/2019 09:28
Instrument ID 10LCMS02
Column ID H18-061776
Ical ID 190522A02

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	18	97	70.0-130.0	447827

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	97	70 - 130	Pass
13C2_PFDA	2.0	2.1	105	70 - 130	Pass
d5-EtFOSAA	8.0	7.8	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPnOPrA	100665	57101 - 171302	---	Pass
13C2_PFOA	380314	177885 - 533654	---	Pass
13C4_PFOS	538861	262955 - 788866	---	Pass
d3-MeFOSAA	150404	71669 - 215006	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID	ICV-12332-189	Instrument ID	10LCMS02
Run File Name	B190528A_010	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/28/2019 09:42		

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	19	97	70.0-130.0	471810

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	96	70 - 130	Pass
13C2_PFDA	2.0	2.0	99	70 - 130	Pass
d5-EtFOSAA	8.0	8.3	104	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	223888	112299 - 336896	---	Pass
13C2_PFOA	440105	213002 - 639005	---	Pass
13C4_PFOS	568125	281769 - 845307	---	Pass
d3-MeFOSAA	346021	170979 - 512936	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-188-03	Instrument ID	10LCMS02
Run File Name	B190523C_004	Column ID	H18-061776
Injected By	WM	Ical ID	190522A02
Analyzed	05/23/2019 21:09	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	9.8	103	70.0-130.0	250815

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	100	70 - 130	Pass
13C2_PFDA	2.0	1.9	97	70 - 130	Pass
d5-EtFOSAA	8.0	8.1	101	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPtA	107175	57101 - 171302	79538 - 159076	Pass
13C2_PFOA	391659	177885 - 533654	259754 - 519508	Pass
13C4_PFOS	567045	262955 - 788866	412254 - 824509	Pass
d3-MeFOSAA	166529	71669 - 215006	112981 - 225962	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Calibration Verification Summary CCV

Lab Calibration ID	CAL-12332-188-03	Instrument ID	10LCMS02
Run File Name	B190523C_017	Column ID	H18-061776
Injected By	WM	Ical ID	190522A02
Analyzed	05/23/2019 23:42	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	9.4	98	70.0-130.0	244842

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	98	70 - 130	Pass
13C2_PFDA	2.0	2.0	100	70 - 130	Pass
d5-EtFOSAA	8.0	7.8	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPtA	124578	57101 - 171302	75023 - 150045	Pass
13C2_PFOA	412309	177885 - 533654	274161 - 548322	Pass
13C4_PFOS	579154	262955 - 788866	396931 - 793862	Pass
d3-MeFOSAA	166382	71669 - 215006	116571 - 233141	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CCV-LOW	Instrument ID	10LCMS02
Run File Name	B190528C_002	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/28/2019 23:02	Level	Low

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	1.9	2.0	102	50.0-150.0	51063

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	102	70 - 130	Pass
13C2_PFDA	2.0	2.1	107	70 - 130	Pass
d5-EtFOSAA	8.0	8.8	110	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	216871	112299 - 336896	145979 - 291958	Pass
13C2_PFOA	423506	213002 - 639005	321793 - 643587	Pass
13C4_PFOS	580902	281769 - 845307	405080 - 810160	Pass
d3-MeFOSAA	335250	170979 - 512936	242924 - 485848	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-188-03	Instrument ID	10LCMS02
Run File Name	B190528C_015	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/29/2019 01:35	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	9.7	101	70.0-130.0	244896

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	99	70 - 130	Pass
13C2_PFDA	2.0	2.1	107	70 - 130	Pass
d5-EtFOSAA	8.0	8.4	105	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	195258	112299 - 336896	151810 - 303619	Pass
13C2_PFOA	430765	213002 - 639005	296454 - 592909	Pass
13C4_PFOS	565246	281769 - 845307	406632 - 813263	Pass
d3-MeFOSAA	340696	170979 - 512936	234675 - 469350	Pass

50-150% of Ical area

70-140% of the preceding CCV area